Copernicus Emergency Management Service

Overview

UN-SPIDER Bonn International Conference (virtual) Space-based Solutions for Disaster Management in Africa

Presented by Vera Thiemig on behalf of the CEMS Flood group
17 November 2021
Overview of CEMS

EU's Earth Observation Programme

6 services use Earth Observation data to deliver...

- Sentinel 3 & Contributing Missions
- In-situ measurements
- ... added value products

Source: ESA
Overview of CEMS

OPERATIONS

• CEMS operational activity since 2012
• Managed by the Joint Research Center of the European Commission

PURPOSE AND IMPACT

• Supports all actors involved in the management of natural or manmade disasters and in particular the EU’s Emergency Response & Coordination Centre (ERCC)
• Addresses all phases of the disaster management cycle from preparedness, response to recovery and prevention
  • Preparedness: forecasts
  • Response: rapid maps and monitoring of events
  • Recovery & prevention: risk assessment for specific hazards and post-disaster recovery maps
Overview of CEMS

THE COPERNICUS EMERGENCY MANAGEMENT SERVICE

On-demand mapping
Rapid Mapping
Risk & Recovery Mapping

Early warning and monitoring
Floods
Fires
Droughts

Exposure Mapping
Population
Built-up areas

New!
On Demand Mapping: Overview

Check three major goals of your request to select the best product serving your needs:

What do I need the information for?

- Emergency Response

How urgent is it?

- Within 24 hours
  Availability: 24/7

- Within 5 working days
  Availability: Working hours / days

How customised are products needed?

- 4 standard products with fixed types of analysis, max AOI size
  - RM SL1

- 20 standard products with fixed types of analysis, max AOI size, scales
  - RRM Standard activation

- Tailor made products for user-specific needs and event-specific characteristics
  - RRM Flex activation

I need more detailed products/results

5 - 15 calendar days

1 - 2 months

Rapid Mapping portfolio

Risk and Recovery Mapping portfolio

emergency.copernicus.eu/mapping
Workflow for On-Demand Mapping

- Direct activation only by **Authorised Users** (Civil Protection):
  - 31 focal points: 27 EU MS + Norway + Iceland + UK + EC Services + EEAS
- Not-authorised users incl. international users can activate through the EU’s Emergency Response Coordination Centre (**ERCC**)

Service Request Form:
- User identification
- Disaster identification
- Product(s) identification

https://emergency.copernicus.eu/mapping/ems/how-use-service
1° impact info delivery within 24h from user request

Rapid Mapping Product Portfolio

Pre-event
- Reference (10h*)

Post-event
- First Estimate (2h*)
- Delineation (7h*)
- Monitoring
- Grading (10h*)
- Monitoring

Delineation

- Flood delineation in France, 2019 (EMSR411)
- Pre-volcanic eruption in the Philippines, 2019 (EMSR418)
- Wildfires Australia, 2019 (EMSR408)

Detailed damage assessment

Earthquake & Tsunami in Indonesia, 2018 (EMSR317)

* Production time after image reception
Rapid Mapping Examples

Tropical Cyclone Eloise 22-23 January 2021, Mozambique
(https://emergency.copernicus.eu/mapping/list-of-components/EMSR495)

Nyiragongo volcano 22 May 2021, Congo, Rwanda
(https://emergency.copernicus.eu/mapping/list-of-components/EMSR513)
• **Production** during working hours
• Supports preparedness & recovery activities
• **Delivery** in days (standard products) or 1-2 month (tailored studies)
• Uses satellite imagery and other data

**Standard Products (examples)**
- Digital Surface Model
- Modelled flood extent for major events
- Temporal analyses of occurred flood events
- Reconstruction monitoring
- Ground deformation analyses
- Impact assessment/exposure analysis for assets & population
- Post-disaster soil erosion risk assessment
- Post-disaster landslide risk assessment
- Population displacement location
Post-event analysis tropical cyclone Eloise

- Two areas of interest (proximity of Beira)
- DG ECHO/African Risk Capacity Agency
- [https://emergency.copernicus.eu/mapping/list-of-components/EMSN086](https://emergency.copernicus.eu/mapping/list-of-components/EMSN086)
Overview of CEMS

THE COPERNICUS EMERGENCY MANAGEMENT SERVICE
**CEMS Flood forecast and monitoring service**

GloFAS = Global Flood Awareness System  
GFM = Global Flood Monitoring

GloFAS and GFM provide:

- Global **hydrological ensemble forecasts** updated daily
- Global, **SAR-based, flood monitoring** with timeliness of >8 hours and revisit frequency of 3-12 days at 20m resolution (under dev.)
- **Map products and datasets** through dedicated web and data services
- **Highlights** of expected flooding and associated flood risk level over next 30 days
- **Seasonal hydrological outlook** showing wet/dry anomalies over next 16 weeks

[https://www.globalfloods.eu/](https://www.globalfloods.eu/)
Emergency Management

**Early Warning & Monitoring – Droughts**

GDO = Global Drought Observatory

- **GDO provides**
  - Early warning, monitoring and forecasting of *droughts* and their likely *impacts*, based on satellite data, hydro-meteorological modelling and in-situ observations.
  - Based on a conceptual model of *drought risk*

- **For Whom?**
  - European Emergency Response Coordination Centre (ERCC)
  - Global Disaster Alert and Coordination System (GDACS)
  - International aid organizations, EEAS, UNCCD

For Europe: [https://edo.jrc.ec.europa.eu/](https://edo.jrc.ec.europa.eu/)

Emergency Management

Forest Fire Information System

http://gwis.jrc.ec.europa.eu

- Joint initiative between GEO, NASA and JRC
- Not yet fully operational in CEMS (integration ongoing)
- Provide a comprehensive view and evaluation of fire regimes and fire effects at global level
- Provide tools to support operational wildfire management from national to global scales.
- Complements national fire information systems through the provision of harmonised data, methods and standards

Users: EC DGs and Services, EP, national/regional forest fire and civil protection services, FAO, UNECE, UNISDR

Main outputs
- Fire danger forecast
  - Fire danger forecast up to 10 days in advance on the bases of the Canadian Fire Weather Index (FWI)
- Active fire detection (MODIS, VIIRS)
- Near real time burnt areas (MODIS, VIIRS)
- Country profiles (fire regimes)
THE COPERNICUS EMERGENCY MANAGEMENT SERVICE
Exposure Mapping: the Global Human Settlement Layer

Exposure Mapping

- Information on exposed population, housing and other assets is fundamental to manage crisis and reduce disaster risk
- The new CEMS component provides accurate information derived from satellite and census data on the presence and characteristics of settlements and population
- Products are already used by all CMES services
The GHSL exposure mapping products

- **Global built-up** fraction data at 10 m spatial resolution based on Copernicus Sentinel data
- **Global built-up change** from historical Landsat data (1975-2018)
- **Global Population** density maps at 100 m spatial resolution
- **Annual updates** of spatial grids
- Planned starting date of built-up area production 2022
All services and products presented are free and open for everyone!

https://emergency.copernicus.eu/